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10/814,374	03/30/2004	Ramesh V. Peri	1020.P18414	5495

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EXAMINER	
KANG, INSUN	
ART UNIT	**PAPER NUMBER**
2193	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/814,374	PERI ET AL.	
	Examiner	Art Unit	
	INSUN KANG	2193	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 August 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5 and 7-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5 and 7-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This action is responding to amendment filed on 8/20/2008.

2. Claims 1-5 and 7-20 are pending in the application.

Claim Rejections - 35 USC § 112

3. Claims 1-5, 7-14, 19, and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Per claims 1 (line 4), claim 11 (line 8), claim 19 (line 6), "a set of program instructions" is unclear to which set of program instructions it is referring: Interpretation: said set of program instructions. Per claims 2-5, 7-10, 12-14, and 20, these claims are rejected based on dependency on the rejected parent claims 1, 11, and 19.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-5, 7, 8, 11, 13-15, and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ball et al. ("Efficient Path Profiling," IEEE, pages 1-12, 1996) hereafter Ball in view of Alexander et al. (US 6,553,564) hereafter Alexander.

Per claim 1:

Ball discloses:

- assigning a partial path value to each partial path value field in a branch instruction for a set of program instructions (i.e. see Figure 2 in page 2, the acyclic control flow graph shown in Figure 2 has partial path values, 0, 2, 4 etc that ultimately are used for the path identifier values (0-5) of ACDF, ACDEF etc; page 2, right col. first par.)
- generating a trace for a subset of program instructions formed from a set of program instructions, with said trace comprising a path identifier value, start address, and end address said path identifier value generated using at least one of said partial path value for said subset of program instructions (i.e. "The path profiling algorithm first labels edges in a DAG with integer values, such that each path from the entry to the exit of the DAG produces a unique sum of the edge values along that path," page 4, right col., second paragraph; Figure 2 in page 2) ;
- storing said trace in a trace buffer (i.e. "a trace buffer that records branch outcomes," page 4, left col., second paragraph);
- retrieving said trace from said trace buffer and reproducing said subset of program instructions using said trace (i.e. "To recreate a path profile from the path counters recorded at run time, it is necessary to map from integer representing a path to the path itself…the reconstructed path," page 6, right col., 3.5 Regenerating a Path section, lines 1-11).

Ball discloses that said subset of program instructions comprises a function (i.e. "the execution of a local portion of a program, such as routine," pages 1, right col., paragraph 1). Ball does not explicitly teach that a number of traces stored in the trace buffer is proportional to a number of functions in the program instructions. However, Alexander

teaches it was known in the pertinent art, at the time applicant's invention was made, to determine the number of methods in a trace record by setting a counter (i.e. Fig. 8; col. 12, lines 5-25). It would have been obvious for one having ordinary skill in the art to modify Ball's disclosed system to incorporate the teachings of Alexander. The modification would be obvious because one having ordinary skill in the art would be motivated to obtain profile information from reduced trace records based on the number of functions.

Per claim 2:

Ball further discloses:

-receiving an endpoint program instruction for said subset of program instructions (i.e., page 2, right col., lines 6-9);

- generating said path identifier value and end address for said subset of program instructions (i.e. page 2, right col., lines 10-13);
- retrieving said start address from a program counter register (i.e. page 2, right col., second paragraph lines 1-6)

generating said trace using said path identifier value, start address and end address (i.e. page 5, left col., section 3.2 Compactly Representing Paths with Sums, lines 1-6).

Per claim 3:

Ball further discloses:

- initializing a path identifier register, with said path identifier register to store said end address and said path identifier value (i.e. page 6, section 3.4 Instrumentation, second paragraph)
- assigning each unconditional branch instruction for said set of program instructions an unconditional partial path value and an unconditional offset value (i.e. page 3, left col., third paragraph, lines 8-12)
- and assigning each conditional branch instruction for said set of program instructions a taken branch partial path value, an untaken branch partial path value, and a conditional offset value (i.e. page 2, right col., first paragraph, lines 5-8, 14-15).

Per claim 4:

Ball further discloses:

- receiving said branch and determining whether said branch instruction is a conditional branch instruction or unconditional branch instruction (i.e. page 2, right col., first paragraph, lines 5-8)
- incrementing said path identifier value with said unconditional partial path value and said end address with said unconditional offset value if said branch instruction is an unconditional branch instruction (i.e. page 6, section 3.4 Instrumentation, second paragraph; page 2, Figure 2)
- incrementing said path identifier value with said taken branch partial path value and said end address with said conditional offset value if said branch instruction is a conditional branch instruction that was taken; and incrementing said path identifier

value with said untaken branch partial path value and said end address with said conditional offset value if said branch instruction is a conditional branch instruction that was untaken (i.e. "Taking a conditional branch narrows the set of potential paths and corresponds to a transition to a new state," page 2, right col., lines 5-6; "At the end of the loop body…register r holds the index to increment an array of counters," page 2, right col., second paragraph lines 3-6).

Per claim 5:

Ball further discloses:

- comprising initializing said path identifier register prior to processing another conditional branch instruction (i.e. "initializing path register r[r=0] in the ENTRY vertex," page 6, right col., 3.4 Instrumentation, second paragraph, lines 2-3).

Per claim 7:

Ball further discloses:

- wherein said path identifier and end address each comprise 32 bits (i.e. "the states can be represented as 32-bit integers," page 3 right col., section 1.3, second paragraph, line 9).

Per claim 8:

Ball further discloses:

- wherein said conditional branch instruction and said unconditional branch instruction each comprise 32 bits (i.e. "the states can be represented as 32-bit integers," page 3 right col., section 1.3, second paragraph, line 9).

Per claims 11 and 13, they are the apparatus versions of claim 1, respectively, and are rejected for the same reasons set forth in connection with the rejection of claim 1 above.

Per claim 14:

Ball discloses:

- a path identifier register (i.e. page 8, section 5.1 Registers, "a local register…to hold the current path," lines 1-4)
- a program counter register (i.e. counter, page 6, left col., 3.4 Instrumentation, second paragraph, line 5)
- and a path identifier generator operatively coupled to said path identifier register and said program counter register, said path identifier generator to receive an endpoint program instruction for said subset of program instructions, to generate said path identifier value and end address for said subset of program instructions using said path identifier register, to retrieve said start address from a program counter register, and generate said trace using said path identifier value, start address and end address (i.e. "initializing path register r[r=0] in the ENTRY vertex," page 6, right col., 3.4 Instrumentation, second paragraph, lines 2-3; page 5, left col., section 3.2 Compactly Representing Paths with Sums, lines 1-6; page 2, right col., lines 10-13).

Per claims 15, 17, and 18, they are the wireless system versions of claims 11, 13, and 14, respectively, and are rejected for the same reasons set forth in connection with the rejection of claims 11, 13, and 14 above.

Per claims 19 and 20 they are other method versions of claims 11, 13, and 14, respectively, and are rejected for the same reasons set forth in connection with the rejection of claims 11, 13, and 14 above.

6. Claims 9, 10, 12, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ball et al. ("Efficient Path Profiling," IEEE, pages 1-12, 1996) hereafter Ball, in view of Alexander et al. (US 6,553,564) hereafter Alexander, and further in view of Mann (US Patent 6,094,729).

Per claim 9:

Ball does not explicitly teach that said conditional branch instruction and said unconditional branch instruction further comprise an operation code value to identify a type of instruction. However, Mann teaches such an operation code value was known in the pertinent art, at the time applicant's invention was made, to indicate the data type (i.e. col. 3 lines 3-9). It would have been obvious for one having ordinary skill in the art to modify Ball's disclosed system to incorporate the teachings of Mann. The modification would be obvious because one having ordinary skill in the art would be motivated to indicate the data type to identify different types of instructions fast (i.e. col. 3 lines 3-9).

Per claim 10:

Ball discloses that said trace buffer comprises N entries (i.e. "a trace buffer that records branch outcomes," page 4, left col., second paragraph). Ball does not explicitly teach moving traces from said trace buffer to another storage location after storing N entries. However, Mann teaches it was known in the pertinent art, at the time applicant's invention was made, to move trace data into another storage if desired (i.e. col. 24 lines 5-15). It would have been obvious for one having ordinary skill in the art to modify Ball's disclosed system to incorporate the teachings of Mann. The modification would be obvious because one having ordinary skill in the art would be motivated to move the trace data into memory when the trace buffer is not available for storing the traces (i.e. col. 24 lines 5-15).

Per claim 12, this claim is the apparatus version of the claimed method discussed in claim 10, wherein all claim limitation also have been addressed and/or covered in cited areas as set forth the above.

Per claim 16, this claim is the system version of the claimed method discussed in claim 10, wherein all claim limitations also have been addressed and/or covered in cited areas as set forth the above.

Response to Arguments

7. Applicant's arguments filed on 8/20/2008 have been fully considered but they are not persuasive.

Applicant states that updating the state in path register r is clearly different than assigning a partial path value to each partial path value field in a branch instruction (remark, 9-10).

In response, Ball clearly presents the partial path values to each path field in a routine including a branch (i.e. page 2, right col., first par.) in the acyclic control flow graph shown in Figure 2 of page 2. The partial path values, 0, 2, 4 etc are summed up to produce the path identifier values (0-5) of ACDF, ACDEF etc. For example, the path identifier 3 of the path ABCDEF is produced based on the sum of the partial path values 0+2+1. In the specification (page 16, paragraph 45) of the instant application and the corresponding Figure 6, the path identifiers 0-5 of each path are also produced by calculation of the partial values in Figure 6.

Applicant states that storing a count value of a single path taken through the routine is clearly different from said trace comprising a path identifier value, start address, and end address, said path identifier value generated using at least one of said partial path value for said subset of program instructions and storing said trace in trace buffer (remark, 10).

In response, Ball discloses the trace buffer storing a trace (i.e. "a trace buffer that records branch outcomes," page 4, left col., second paragraph) comprising path identifier values for each path and the addresses. In the exemplary figure 2, the node A holds the entry address while F does the end address of each path. Each path in the CFG contains ENTRT to EXIT (page 7, right col. section 4, third par.).

Applicant states that: Alexander fails to teach or suggest generating a trace for a subset of program instructions formed from a set of program instructions, with said trace comprising a path identifier value, start address, and end address, said path identifier value generated using at least one of said partial path value for said subset of program instructions (remark, 10).

In response, as addressed above Ball teaches generating a trace…generated using at least one of said partial path value for said subset of program instructions (i.e. "The path profiling

algorithm first labels edges in a DAG with integer values, such that each path from the entry to the exit of the DAG produces a unique sum of the edge values along that path," page 4, right col., second paragraph). Ball further discloses that said subset of program instructions comprises a function (i.e. "the execution of a local portion of a program, such as routine," pages 1, right col., paragraph 1). Alexander teaches a number of traces stored in the trace buffer that is proportional to a number of functions in the program instructions to determine the number of methods in a trace record by setting a counter (i.e. Fig. 8; col. 12, lines 5-25). Therefore, all the limitations are taught by Ball and Alexander. Accordingly, the applicant's general allegation that "there is no teaching or motivation to modify Ball and/or Alexander to include all the features of amended independent claim 1, consequently, are insufficient to render amended independent claim 1 obvious (remark, 10)" without specifically pointing out why the combination is improper is not persuasive.

Per claims 11, 15, 19:

The applicant states that the claims are allowable for the reasons set forth in connection with claim 1. As shown above, the rejection of claim 1 by Ball and Alexander is maintained, and accordingly, the rejections of claims 11, 15, and 19 are also maintained.

Per claims 2-5, 7, 8, 13, 14, 17, 18, and 20:

The applicant states that the dependent claims are allowable as being dependent on the allowable base claims. As shown above, the rejections of the independent claims 1, 11, 15, and 19 are maintained, the argument that claims 2-5,7, 8, 13, 14, 17, 18, and 20 are allowable as being

dependent on the allowable base claims is considered moot. Accordingly, the rejections of claims 2-5,7, 8, 13, 14, 17, 18, and 20 are maintained.

Per claims 9, 10, 12, and 16:

The applicant states that Ball, Alexander, and Mann fail to teach every element recited in amended claim 1 (remark 11).

In response, this has been addressed above.

Conclusion

8. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to INSUN KANG whose telephone number is (571)272-3724. The examiner can normally be reached on M-R 7:30-6 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lewis A. Bullock, Jr. can be reached on 571-272-3759. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Insun Kang/
Examiner, Art Unit 2193